

## Correspondence

### Measurement of bronchial reactivity: a question of interpretation

Sir,—In their letter in the December 1981 issue (p 960) Dr EH Walters and his colleagues indicate that asthmatics with abnormal baseline values of specific airway conductance (sGaw) showed a lower reactivity to histamine (slope of dose-response curve) than normal subjects. They suggest that we reached an opposite conclusion<sup>1</sup> because we inappropriately used an arithmetic plot of the doses. The rules of in vitro pharmacology, however, do not necessarily apply to in vivo pharmacology. In vitro pharmacologists use a log plot of doses for two purposes: (1) linearising the dose-response curve around the response representing 50% of the maximal response; (2) determining the relative potency of various agonists yielding parallel dose-response lines.<sup>2</sup> In vitro, the sigmoid shape of the dose-response curves obtained with a log plot is justified by the theory of drug-receptor interaction. In vivo, factors other than drug-receptor interaction intervene to determine the shape of the dose-response curve and a sigmoid shape is unlikely to occur.<sup>3</sup> Furthermore, a maximal response cannot be obtained.

In our study<sup>1</sup> the dose-response relationships obtained by measuring changes in specific airway resistance (sRaw) in response to graded doses of carbachol (arithmetic plot) were curvilinear (hyperbolic appearance). In order to assess easily the slopes of such dose-response curves we wanted to linearise them and found that linearisation was obtained with a reciprocal plot of sRaw—that is, sGaw. In contrast, a log plot of dose versus sRaw made the curves even more curvilinear. Linearisation could also be achieved with other transformations of sRaw.<sup>4 5</sup>

Moreover, in our study we selected the patient group so that baseline sGaw was similar to that of the normal group.<sup>1</sup> This was not the case for Dr Walters's patients but the authors do not indicate whether they expressed the sGaw response as absolute or percentage changes for the slope calculation. If they used absolute values, their finding might have been biased because of the hyperbolic relationship between sGaw and sRaw: the same absolute change in sRaw would appear large or small when transformed into sGaw, depending on the initial value of sRaw.<sup>6</sup> On the other hand, one should also be cautious about using percentages when the starting values are different; the same absolute change of sGaw would appear very different when

expressed as percentage change from a low or a high initial sGaw value. Perhaps an acceptable way would be to express the changes as percentages of the predicted sGaw values in order to have both groups of subjects starting from the same point. Otherwise slope comparisons may be difficult to interpret.

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### References

- <sup>1</sup> Orehek J, Gayrard P, Smith AP, Grimaud C, Charpin J. *Am Rev Respir Dis* 1977;115:937-43.
- <sup>2</sup> Bowman WC, Rand MJ, eds. *Textbook of pharmacology*. 2nd ed. Oxford: Blackwell Scientific Publications, 1980.
- <sup>3</sup> Orehek J. *Bull Eur Physiopathol Respir* 1981;17:329-32.
- <sup>4</sup> Holtzman MJ, Sheller JR, Dimeo M, Nadel JA, Boushey HA. *Am Rev Respir Dis* 1980;122:17-25.
- <sup>5</sup> Garcia-Herreros, Agama M, Van Steenberghe J, et al. In: Herzog H, ed. *Asthma*. Basel: Karger, 78-86.
- <sup>6</sup> Gayrard P, Orehek J, Charpin J. *Respiration* 1975;32:293-304.

### Notice

**First International Conference on the Endocrine Lung in Health and Disease. Hyatt Regency Washington on Capitol Hill, Washington DC, 2-4 June 1982.**

Sponsored by the George Washington University Medical Center, Washington, and organised by Drs KL Becker and AF Gazdar, the First International Conference on the Endocrine Lung in Health and Disease will include the following main topics: anatomy, embryology, and histochemistry of pulmonary endocrine cells; chemistry and physiology of peptide hormones of the lung; pathophysiology of endocrine tumours of the lung. For further information please contact Peter Petrossian (Office of CME), George Washington Medical Center, 2300 K Street NW, Washington DC 20037.